BGS12AL7-6

SPDT RF Switch

Data Sheet

Revision 2.1, 2009-12-09

RF & Protection Devices

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BGS12AL7-6 SPDT RF Switch

Revision History: 2009-12-09, Revision 2.1

Previous Revision: 2009-11-24, V2.0

Page	Subjects (major changes since last revision)
11	max. Values for Insertion Loss @ T_A = -30 °C...+85 °C

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Last Trademarks Update 2009-10-19

Table of Contents

Table of Contents 4
List of Figures 5
List of Tables 6
1 Features 7
2 Maximum Ratings 9
3 Pin Description 10
4 Electrical Specifications 11
5 Measurement Results 12
6 Package Outlines 14

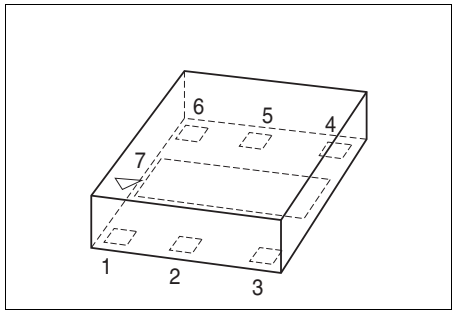
List of Figures

Figure 1 Functional Diagram. 8
Figure 2 Pin Configuration (top view) 10
Figure 3 Measurement Results (@ T = 25°C) 12
Figure 4 Application Board: No External Components Necessary 13
Figure 5 Deembedding Board 13
Figure 6 Package TSLP7-6. 14
Figure 7 Marking Info 14
Figure 8 Board pad (SMD) & Apertures 14
Figure 9 Tape and Reel 15

List of Tables

Table 1 Maximum Ratings 9
Table 2 Operation Ranges 9
Table 3 Pin Description 10
Table 4 Truth Table 10
Table 5 Electrical Characteristics 11

1 Features



Main features:

- Low insertion loss
- High port-to-port-isolation
- Low harmonic generation
- On-chip control logic, only one control line required
- High ESD robustness
- No external components required
- General purpose switch for applications up to 3 GHz
- Small leadless package TSLP-7-6
- Lead and halogen free package (RoHS and WEEE compliant)

RoHS

Description

The BGS12AL7-6 General Purpose RF MOS switch is designed to cover a broad range of applications from 30 MHz to 3 GHz. The symmetric design of its single pole double throw configuration, as shown in **Figure 1** offers high design flexibility. This single supply chip integrates on-chip CMOS logic driven by a simple, single-pin CMOS or TTL compatible control input signal. The 0.1 dB compression point exceeds the switch's maximum input power level of 21 dBm, resulting in linear performance at all signal levels. The RF switch has a very low insertion loss of 0.4 dB in the 1 GHz and 0.5 dB in the 2 GHz range.

Unlike GaAs technology, external DC blocking capacitors at the RF ports are only required if DC voltage is applied externally.

Product Name	Package	Chip	Marking
BGS12AL7-6	TSLP7-6	M4781	12

The BGS12AL7-6 RF switch is manufactured in Infineon's patented MOS technology, offering the performance of GaAs with the economy and integration of conventional CMOS including the inherent higher ESD robustness.

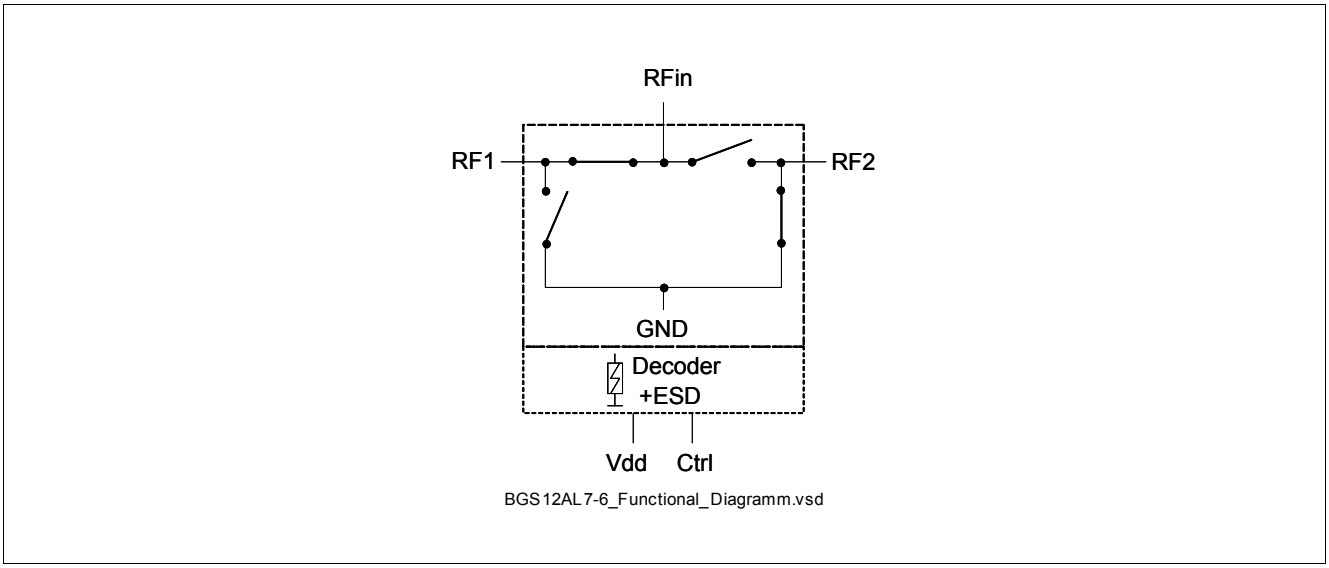


Figure 1 Functional Diagram

2 Maximum Ratings

Table 1 Maximum Ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Storage temperature range	T_{stg}	-65	–	150	°C	–
DC Voltage at all pins to GND	V_{DC}	–	–	5	V	–
RF power max. at all RF ports	P_{IN}	–	–	24	dBm	–
ESD Capability						
Human Body Model IEC61340-3-1	V_{ESD}	–	–	1000	V	–
Machine Model IEC61340-3-2		–	–	100		
Charge Device Model JEDEC JESD22-C101D		–	–	1500		–

Table 2 Operation Ranges

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Ambient temperature	T_A	-30	–	85	°C	–
RF Frequency	f	0.03	–	3	GHz	–
Control voltage low	V_{CtrL}	-0.3	–	0.3	V	–
Control voltage high	V_{CtrlH}	1.4	–	Vdd	V	–
Supply voltage[1)]	V_{dd}	2.4	–	3.6	V	–
Current consumption Vdd Pin (over temperature)	I_{Vdd}	80	–	350	µA	–
Current Consumption Vctrl Pin	I_{Ctrl}	–	–	30	µA	–
Power Range	P_{in}	–	–	–	dBm	–
(VSWR ∞: 1)		–	–	15		–
(VSWR 3: 1)		–	–	18		–
(VSWR 1: 1)		–	–	21		–

1) Supply voltage must be connected before Control Voltage

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

3 Pin Description

Table 3 Pin Description

Pin No.	Name	Pin Type	Buffer Type	Function
1	RF2	I/O		**RF Port 2 Out**
2	GND	GND		**Ground**
3	RF1	I/O		**RF Port 1 Out**
4	Vdd	PWR		**Supply Voltage**
5	RFIN	I/O		**RF Port In**
6	CTRL	I		**Control Pin**
7	NC	NC		**It is recommended to connect Pin 7 to Ground**

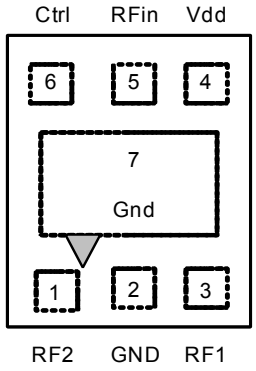


Figure 2 Pin Configuration (top view)

Table 4 Truth Table

Ctrl 1	RF 1	RF 2
0	1	0
1	0	1

4 Electrical Specifications

Test Conditions:

- Termination port impedance: Z_0 = 50 Ω
- Temperature range: T_A = -30 °C...+85 °C
- Supply Voltage: V_{dd} = 2.8 V
- P_{in} = 15 dBm
- Across operating range of control voltages: V_{CtrH} = 1.4...2.8 V

Table 5 Electrical Characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion Loss	IL	–	0.3[1)]	0.5[1)]	dB	f = 0.1 GHz, T_A = 25 °C
		–	0.35	0.6	dB	f = 1 GHz, T_A = 25 °C
		–	0.5	0.7	dB	f = 2 GHz, T_A = 25 °C
		–	–	0.6[1)]	dB	f = 0.1 GHz
		–	–	0.7[1)]	dB	f = 1 GHz
		–	–	0.8[1)]	dB	f = 2 GHz
Return Loss	RL	–	30[1)]	–	dB	f = 0.1 GHz
		15	20	–	dB	f = 1 GHz
		12	15	–	dB	f = 2 GHz
Isolation RFin - RF1	$ISO_{RFin-RF1}$	–	50[1)]	–	dB	f = 0.1 GHz
		20	32	–	dB	f = 1 GHz
		15	25	–	dB	f = 2 GHz
Isolation RFin - RF2	$ISO_{RFin-RF2}$	–	50[1)]	–	dB	f = 0.1 GHz
		20	32	–	dB	f = 1 GHz
		15	25	–	dB	f = 2 GHz
Isolation RF1 - RF2	$ISO_{RF1-RF2}$	–	50[1)]	–	dB	f = 0.1 GHz
		24	32	–	dB	f = 1 GHz
		15	25	–	dB	f = 2 GHz
Isolation RF ports - Vdd, Vctrl	ISO_{RF-DC}	25	30[1)]	–	dB	f = 1 GHz
		15	20[1)]	–	dB	f = 2 GHz
Harmonic Generation up to 12.75 GHz	P_{Harm}	–	-75[1)]	-50	dBm	f = 1 GHz
		–	-80[1)]	-50	dBm	f = 2 GHz
On Switching Time (10-90%) RF	t_{on}	–	3[1)]	5	µs	f = 1 GHz
Off Switching Time (10-90%) RF	t_{off}	–	0.5[1)]	5	µs	f = 1 GHz
Current Consumption at Vdd Pin	I_{dd}	–	140	–	µA	–
Input 0.1 dB compression	$P_{0.1dB}$	21[1)]	–	–	dBm	f = 1 GHz

1) Not measured in production, verified by design

5 Measurement Results

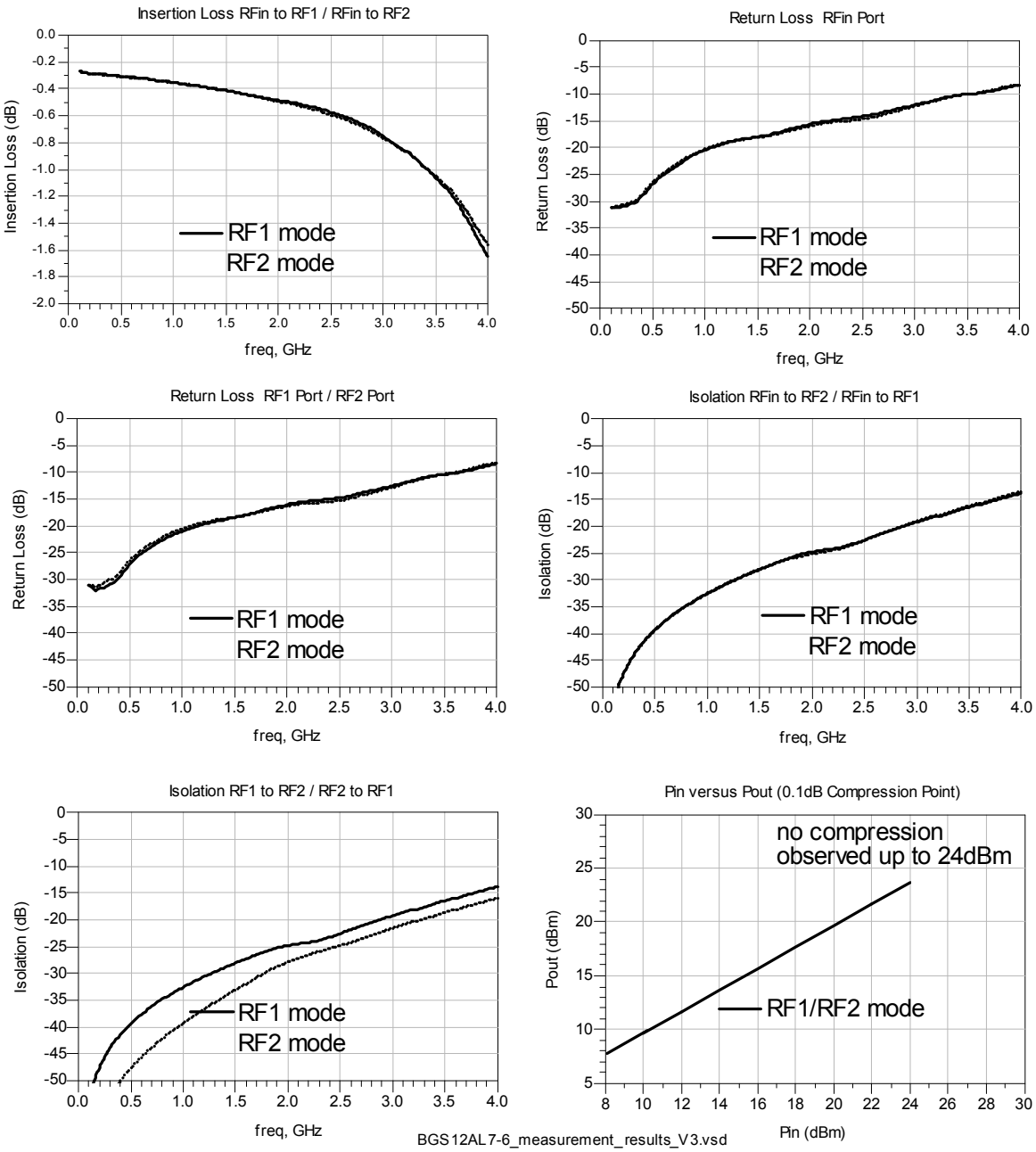


Figure 3 Measurement Results (@ T = 25°C)

Application Board

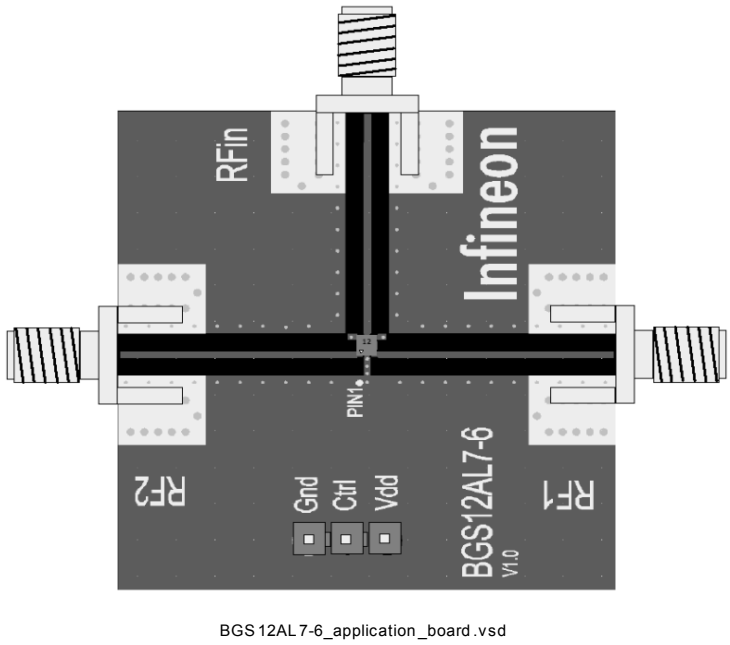


Figure 4 Application Board: No External Components Necessary

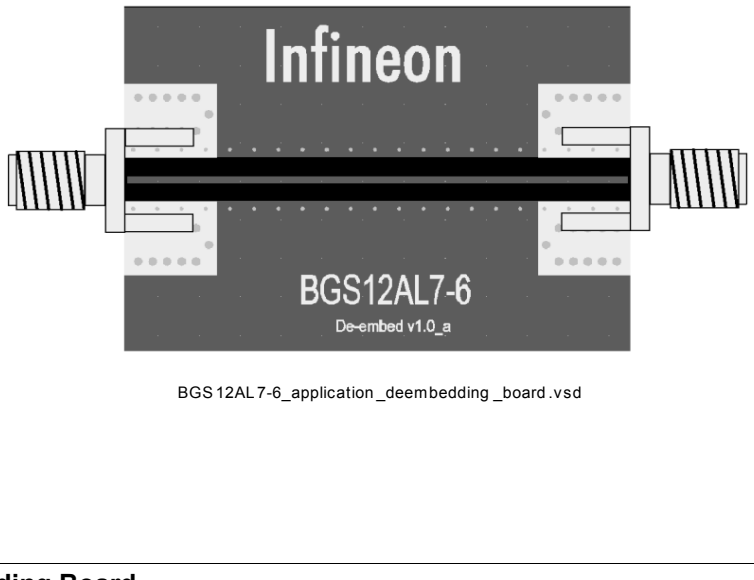


Figure 5 Deembedding Board

6 Package Outlines

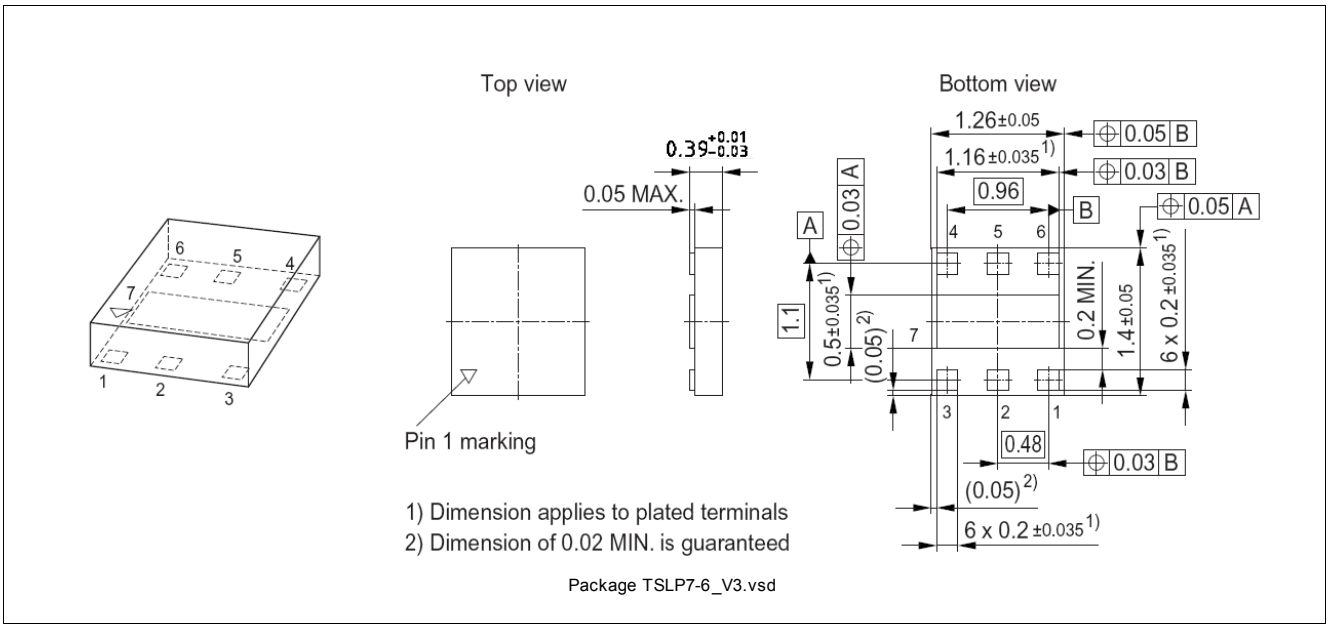


Figure 6 Package TSLP7-6

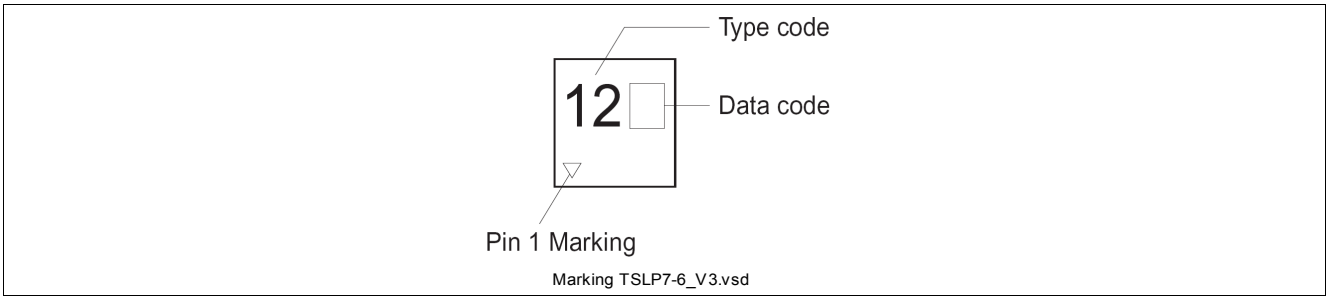


Figure 7 Marking Info

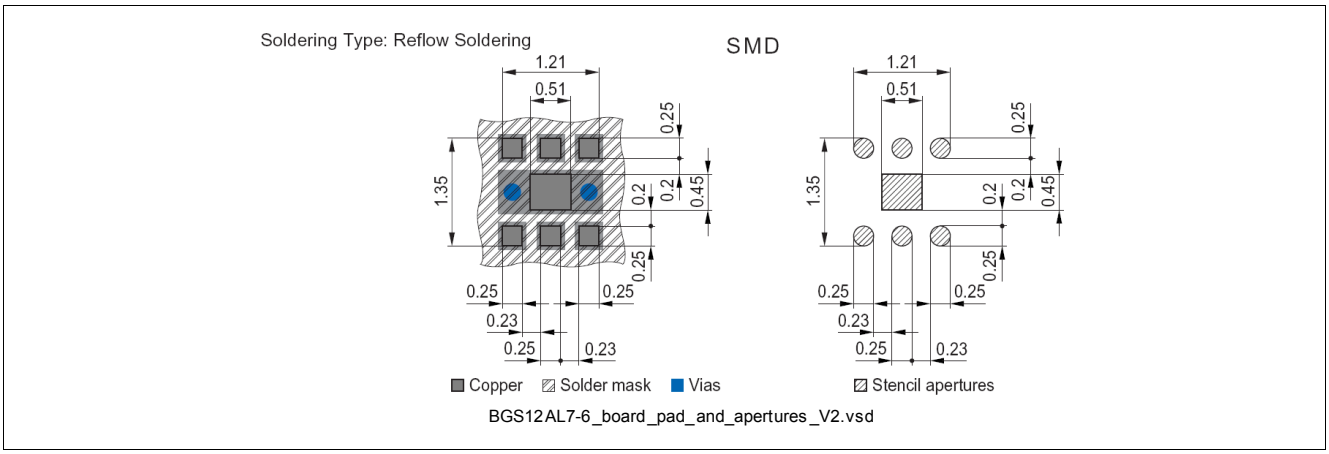


Figure 8 Board pad (SMD) & Apertures

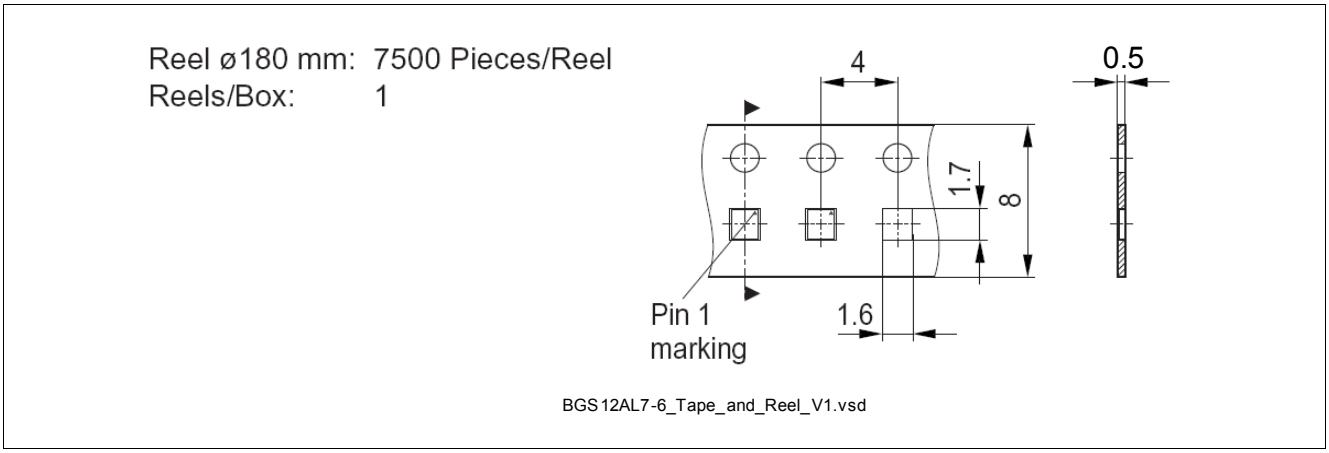


Figure 9 Tape and Reel

Dimensions in mm

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